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EXAMINER	
JOHNSON, TIMOTHY M	
ART UNIT	**PAPER NUMBER**
2623	45

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

Office Action Summary	Application No. 08/941,466	Applicant(s) Zandi et al.
	Examiner T. Johnson	Group Art Unit 2623

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication .
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

☒ Responsive to communication(s) filed on 2/19/2 .

☒ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 1, 4-8, 12-13, & 15-52 ~~is~~/are pending in the application.

Of the above claim(s) ____ is/are withdrawn from consideration.

☐ Claim(s) ____ is/are allowed.

☒ Claim(s) Same as pending ~~is~~/are rejected.

☐ Claim(s) ____ is/are objected to.

☐ Claim(s) ____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The proposed drawing correction, filed on ____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on ____ is/are objected to by the Examiner.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 11 9(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) ____ .

☐ received in this national stage application from the International Bureau (PCT Rule 1 7.2(a)).

*Certified copies not received: ____ .

Attachment(s)

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). ____

☐ Interview Summary, PTO-413

☐ Notice of Reference(s) Cited, PTO-892

☐ Notice of Informal Patent Application, PTO-152

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Other ____

Office Action Summary

U. S. Patent and Trademark Office
PTO-326 (Rev. 9-97)

*U.S. GPO: 1997-433-221/62717

Part of Paper No. 45

Part III Detailed Action

Information Disclosure Statement

1. An information disclosure statement, paper #41, which does not have a filing date, is incomplete. Only pages 3 of 6 through 6 of 6 are present. To give an indication of when the paper was filed, it is listed on the file wrapper after amendment G filed April 18, 2001, and before the Office action mailed June 1, 2001. The Applicant is respectively requested to submit, or re-submit, a complete IDS, so that if the case issues, there will not later be any delays or inconveniences to the Applicant.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

3. Claims 1, 4-8, 12-13, and 15-38 are rejected under 35 U.S.C. 103 as being unpatentable over the combination of Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients", in view of Woods, "Subband Image Coding", Ormsby et al., 5,455,874, and (either Pollara et al., "Rate-distortion efficiency of subband coding with integer coefficient filters", or the Applicant's admitted prior art).

For claim 1, applying a reversible wavelet transform to the input data to produce a series of coefficients is provided by Shapiro in at least the abstract and section B in the left column on page 3446. Although applying an overlapped transform is not explicitly provided by Shapiro, but is suggested, since the length can be greater than the number of filters, where Woods is used only to show that Shapiro does satisfy this definition. Note also that Shapiro refers to Woods at least twice - see page 3447. Shapiro provides for 9-tap quadrature mirror filters (QMFs) on page

3448, left column, lines 13-16, where the number of taps corresponds to the length of the filters, where Woods notes that QMFs may consist of one pair of filters in the first paragraph on page 102, and examples of two filters are shown in Fig. 3.2 and 3.3 on pages 105 and 106, and Woods also provides for various numbers of taps for QMF filters in section 4.6 on page 180, and for QMFs which "include a variety of filters with different ... filter lengths" in the first full paragraph on page 107. Woods also provides for 80-tap filters in a 16-band system (indicating 16 filters), which are noted on page 180 in the first paragraph of section 4.6. Shapiro can use the various different conventional and well known filters of Woods, since they both provide for QMF filters. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use these overlapped transforms as well, since they are used in a subband system of which is used by Shapiro, because these filters have "good reconstruction properties", and because "it is often convenient to use one of the optimized FIR QMFs".

Wherein the overlapped reversible wavelet transform is implemented in integer arithmetic such that, with integer coefficients, integer input data is losslessly recoverable is not explicitly provided by Shapiro. Integer coefficients produced in a reversible transform is basically indicated as prior art by the Applicant on at least page 22 of the Applicant's specification, and is further not critical nor provides unexpected results, since at least the transform of Shapiro is lossless as shown in Fig. 3 on page 3448, and Woods further provide for exactly reconstructing transform filters on at least page 105. It would've been obvious to one having ordinary skill in the art at the time the invention was made that an integer transform producing integer coefficients is conventional and well known based on the Applicant's admitted prior art on at least page 22 of the Applicant's specification. Secondly, all transforms produce integers in at least the broad sense. Thirdly, Pollara et al. explicitly provide for integer coefficients using a lossless wavelet transform in at least the abstract. It would've been obvious to one having ordinary skill in the art at the time the invention was made to produce integer coefficients for lossless transformation QMF's as taught by Pollara et al. in at least the abstract with the QMF's of Shapiro and/or Woods, since Pollara et al. provide for a "simple method to obtain PR" (Perfect Reconstruction) "filters with integer coefficients, without the need for any additional constraint to be satisfied" – abstract.

Compressing the series of coefficients into data representing a compressed version of the input data is provided by Shapiro in at least the first full paragraph in section III on page 3448. Shapiro does <u>not explicitly</u> provide for context modeling bits of the coefficients based on known coefficients in other frequency bands and neighboring coefficients in the same frequency band. But Shapiro does provide for a context model in the first and second paragraphs in section C on pages 3454-3455, which is based on at least coefficients in other frequency bands in at least Figs. 4 and 5 on page 3450, and in Fig. 7 on page 3453. It is possible that Shapiro also provides for neighboring coefficients in the same frequency band, since he uses anywhere from 2-4 symbols, but is not explicitly taught. Using neighboring coefficients in the same frequency band as a context for entropy coding is conventional and well known, and is provided by Ormsby et al. in at least the third full paragraph in c. 4, where they provide for a "neighboring block" "context", where the blocks have both the same frequency band and other frequency bands in c. 5, lines 27-40, and in the fifth full paragraph in c. 4. Shapiro can use the neighboring coefficients in the same frequency band as provided by Ormsby et al., assuming that they do not already. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the context model of Ormsby et al., since they use the refer to the same classic arithmetic coding reference of Witten et al. for adaptation in their systems - Ormsby et al. in the first full paragraph in c. 11, and Shapiro where cited above as reference "[31]", and because Ormsby et al. improve upon the Witten et al. implementation by using registers and shifts "in order to improve speed" in the third full paragraph in c. 12.

For claim 4, applying the overlapped reversible wavelet transform comprises applying to the input data a plurality of non-minimal length reversible filters comprised of a plurality of one-dimensional filters is provided by Shapiro in paragraph C on page 3447, lines 11-12, and in the description of Figs. 1-2 on page 3447, which provide for application of "separable" "vertical and horizontal filters" where horizontal and vertical refer to a separate single dimension, and Woods also provides for a plurality of one-dimensional filters on at least pages 103-104, where they explicitly provide for "1-D" "filtering". The filters of Shapiro and Woods are non-minimal, since they are long filters.

For claim 5, an image is provided by Shapiro in at least the title, and in the caption for Fig. 1 on page 3447. An image is also provided by Woods in at least the title, and by Ormsby et al. in at least the title and abstract.

For claim 6, bit significance embedding on the series of coefficients is provided by Shapiro on at least page 3446 in the left column.

For claims 7, decompressing the losslessly compressed version of the input data into transformed signals and generating the reconstructed version of the original using an inverse reversible wavelet transform is at least obviously, if not inherently, provided by Shapiro, since they transform the image with the wavelet transform in "decomposition", and explicitly provide for a "decoder" for "reconstructions" in at least the first full paragraph in section A on page 3445, where it is well known that "reconstruction" requires the wavelet transform again to synthesize the subbands together, since otherwise, the image could not be reconstructed. The concept of lossless decompression and wavelets are provided by Shapiro in at least the abstract, and explicitly elsewhere. Woods also provides for the conventional arrangement of reversible subband transforms using QMFs in at least Figs. 3.1 - 3.3 on pages 104-106, provide for wavelets in at least the first full paragraph in section 4.6 on page 180, and where QMF wavelets are also provided by Shapiro where cited above. It would have been obvious to one having ordinary skill in the art at the time the invention was made that Shapiro uses the basic synthesis stage shown by Woods, since this is required to reconstruct the image.

For claim 8, see the rejection of at least claims 1 and 7. See also at least the second full paragraph in c. 13 of Ormsby et al., which provide for context modeling in the decoder, since this was provided by the encoder. Also, the same is at least obviously, if not inherently, provided by Shapiro, since they could not otherwise "reconstruct" the image, which Shapiro does provide for.

For claim 12, see the rejection of at least claims 1 and 8. Woods shows in at least Figs. 3.2 and 3.3, that a first and second pair of filters is used in conventional subband coding such as QMF coding and explicitly notes "reconstruction" on page 105 and filter pairs in the bottom of page 106.

For claim 13, see the rejection of at least claims 1 and 6. Shapiro discloses an embedded wavelet transform encoding system on at least page 3446, in the first four lines of section B in the left column. Shapiro also provides for ordering the coefficients and bit significance embedding of the coefficients in at least the third and fourth bulleted paragraphs of section B on page 3446. Shapiro provides for two different codings of first and second portions of the data by at least significance in Fig. 6, or also by at least the embeddings in section B on page 3454. Shapiro uses an adaptive context model as noted above for at least claim 1.

For claim 15, Shapiro provides for tree coding in at least the second bulleted paragraph under section B. on page 3446, and the title.

For claim 16, Shapiro provides for formatting the coefficients into sign-magnitude format on at least lines 12-18 of the second column on page 3453.

For claim 17, see the rejection of at least claim 13. Coding the bit streams into a single bit stream is provided by at least the first full paragraph of section C on page 3454. Single bit streams are also shown in at least Fig. 3.

For claim 18, see the rejection of at least claim 17, where the coding is entropy coding, and Shapiro also provides for entropy coding as conventional and well known in at least the paragraph bridging pages 3448-3449.

For claim 19, see the rejection of at least claim 15.

For claim 20, see the rejection of at least claim 13.

For claim 21, lossless compression is provided by Shapiro in at least the abstract, the third full paragraph in section A on page 3445, Fig. 3, and in section C on page 3454.

For claim 22, see the rejection of at least claim 1, and an entropy encoder is provided in at least section C on page 3454.

For claim 23, see the rejection of at least claim 22. See also Shapiro in the last bulleted paragraph under section B on page 3446 and in the last paragraph of section A on pages 3453 and 3454, where the coder runs sequentially and can be stopped and thus not receiving all coefficients.

For claim 24, encoding the significance map of the wavelet coefficients on page 3448 in section III of the left column provides for coding the data on a single pass, where the significance map is part of the embedded coder, because it is used to provide an embedded code by ordering in importance as noted in the first few lines in the second column on page 3445. It is also noted that the "successive-approximation" which provides for two passes is evidently not necessary as noted in the first few lines in the left column on page 3453. Furthermore, although Shapiro provides for two passes in the successive-approximation coding, it is noted that on the first "dominant pass", that coding is provided, so that data is again coded in a single pass with the embedded coder.

For claim 25, the overlapped reversible wavelet transform of Shapiro probably comprises a nine, nine transform, since he refers to "the 9-tap symmetric quadrature mirror filters" in at least the first full paragraph on page 3448. Shapiro does not explicitly provide for a Two, Ten transform. Using different variations of filters is conventional and well known, and is provided by Woods on at least page 107 in the first full paragraph as noted above for at least claim 1, where it is obvious for Shapiro to use different filters. The Two, Ten transform is further obvious, since this specific filter is not critical to the Applicant's invention, because the Applicant

recites "The use of a single fixed high-pass filter is <u>not required</u>" on page 30, line 1, with emphasis added. Thus, the filters of Shapiro and Woods provide for at least equivalents.

For claim 26, see the rejection of at least claim 25.

For claim 27, see the rejection of at least claim 25.

For claim 28, see the rejection of at least claim 25.

For claim 29, see the rejection of at least claim 25.

For claim 30, see the rejection of at least claim 25.

For claim 31, see the rejection of at least claims 4 and 25.

For claim 32, see the rejection of at least claim 8.

For claim 33, see the rejection of at least claim 4.

For claim 34, see the rejection of at least claims 4 and 7, where the filters are also used on the decoding side.

For claim 35, see the rejection of at least claim 4.

For claim 36, see the rejection of at least claim 4.

For claim 37, see the rejection of at least claim 4.

For claim 38, see the rejection of at least claim 4.

4. Claims 44-50 are rejected under 35 U.S.C. 103 as being unpatentable over the combination of Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients", in view of Woods, "Subband Image Coding", Ormsby et al., 5,455,874, and (either Pollara et al., "Rate-distortion efficiency of subband coding with integer coefficient filters", or the Applicant's admitted prior art), as applied to claims 1, 4-8, 12-13, 15-38, 41, and 43 above, and further in view of Zhang et al., 5,495,292.

For claims 44-50, Shapiro does not explicitly provide for the overlapped reversible wavelet transform having a determinant equal to one. However, as a separate rejection, it is argued that Shapiro does suggests a determinant of one, since his wavelet transform "can be treated as unitary" in the first full paragraph in the left column on page 3448, so that a determinant of one is at least obviously, if not inherently, provided by Shapiro.

Additionally (as another rejection in addition to Shapiro), Zhang et al. further provide evidence for this conventional and well known aspect of having a determinant of one for a wavelet transform in at least c. 5, lines 25-36. It would've been obvious to one having ordinary skill in the art at the time the invention was made to use a wavelet transform that has a determinant equal to one with the wavelet transform of Shapiro, since Zhang et al. provides for wavelets that provide adequate energy concentration in the low frequency wavelets without too much computation in c. 5, lines 25-36.

5. Claims 39-40, and 42 are rejected under 35 U.S.C. 103 as being unpatentable over the combination of Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients", in view of Woods, "Subband Image Coding", and (either Pollara et al., "Rate-distortion efficiency of subband coding with integer coefficient filters", or the Applicant's admitted prior art).

For claim 39, see the rejection of at least claims 1 and 25.

For claim 40, a context model is provided by at least Shapiro as noted above for at least claim 1, and a bit generator is also provided by Shapiro in at least the second paragraph of section C on page 3454.

For claim 42, see the rejection of at least claims 8 and 25.

6. Claims 41 and 43 are rejected under 35 U.S.C. 103 as being unpatentable over Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients", in view of Woods, "Subband Image Coding", and (either Pollara et al., "Rate-distortion efficiency of subband coding with integer coefficient filters", or the Applicant's admitted prior art), as applied to claims 39-40 and 42 above, and further in view of and Ormsby et al., 5,455,874, as applied to claims 1, 4-8, 12-13, and 15-38 above.

For claim 41, see the rejection of at least claim 1 above.

For claim 43, see the rejection of at least claim 1 above.

7. Claims 51-52 are rejected under 35 U.S.C. 103 as being unpatentable over the combination of Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients", in view of Woods, "Subband Image Coding", and (either Pollara et al., "Rate-distortion efficiency of subband coding with integer coefficient filters", or the Applicant's admitted prior art), as applied to claims 39-40, and 42 above, and further in view of Zhang et al., 5,495,292.

For claims 51-52, Shapiro does not explicitly provide for the overlapped reversible wavelet transform having a determinant equal to one. However, as a separate rejection, it is argued that Shapiro does suggests a determinant of one, since his wavelet transform "can be treated as unitary" in the first full paragraph in the left column on page 3448, so that a determinant of one is at least obviously, if not inherently, provided by Shapiro.

Additionally (as another rejection in addition to Shapiro), Zhang et al. further provide evidence for this conventional and well known aspect of having a determinant of one for a wavelet transform in at least c. 5, lines 25-36. It would've been obvious to one having ordinary skill in the art at the time the invention was made to use a wavelet transform that has a determinant equal to one with the wavelet transform of Shapiro, since Zhang et al. provides for wavelets that provide adequate energy concentration in the low frequency wavelets without too much computation in c. 5, lines 25-36.

8. Claims 25-31 are rejected under 35 U.S.C. 103 as being unpatentable over the combination of Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients", in view of Woods, "Subband Image Coding", Ormsby et al., 5,455,874, and (either Pollara et al., "Rate-distortion efficiency of subband coding with integer coefficient filters", or the Applicant's admitted prior art), as applied to claims 1, 4-8, 12-13, 15-38, 41, and 43 above, and further in view of (either Hartung et al., 5,481,308, or Shinichi, JP406038193A).

For claim 25, as noted above in the rejection of claim 25 with respect to Shapiro, Shapiro does not explicitly provide for a Two, Ten transform, but this conventional and well known filter arrangement is provided by both Hartung et al. and Shinichi in at least the paragraph bridging cols. 2-3, and the abstract respectively. This arrangement can be used with the filters of Shapiro, since they all provide QMFs, and because Shinichi explicitly provides for wavelets. It

would have been obvious to one having ordinary skill in the art at the time the invention was made to use the Two, Ten filters of either Hartung et al. or Shinichi, since Hartung et al. provide for these filters with "minimum delay" in the last full paragraph in c. 5, and for "minimizing quantization effects" in the last full paragraph in c. 14, and Shinichi provide for "enhancing the energy concentration" and "to prevent the production of mosquito noise". The QMFs of Hartung et al. in the paragraph bridging cols. 2-3, are the same as those of Woods cited on page 107.

For claim 26, see the rejection of at least claim 25.

For claim 27, see the rejection of at least claim 25.

For claim 28, see the rejection of at least claim 25.

For claim 29, see the rejection of at least claim 25.

For claim 30, see the rejection of at least claim 25.

For claim 31, see the rejection of at least claims 4 and 25.

9. Claims 39-40, and 42 are rejected under 35 U.S.C. 103 as being unpatentable over the combination of Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients", in view of Woods, "Subband Image Coding", (either Pollara et al., "Rate-distortion efficiency of subband coding with integer coefficient filters", or the Applicant's admitted prior art), and further in view of (either Hartung et al., 5,481,308, or Shinichi, JP406038193A).

For claim 39, see the rejection of at least claims 1 and 25.

For claim 40, a context model is provided by at least Shapiro as noted above for at least claim 1, and a bit generator is also provided by Shapiro in at least the second paragraph of section C on page 3454.

For claim 42, see the rejection of at least claims 8 and 25.

10. Claims 51-52 are rejected under 35 U.S.C. 103 as being unpatentable over the combination of Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients", in

view of Woods, "Subband Image Coding", (either Pollara et al., "Rate-distortion efficiency of subband coding with integer coefficient filters", or the Applicant's admitted prior art), and further in view of (either Hartung et al., 5,481,308, or Shinichi, JP406038193A), as applied to claims 39-40, and 42 above, and further in view of Zhang et al., 5,495,292.

For claims 51-52, Shapiro does not explicitly provide for the overlapped reversible wavelet transform having a determinant equal to one. However, as a separate rejection, it is argued that Shapiro does suggests a determinant of one, since his wavelet transform "can be treated as unitary" in the first full paragraph in the left column on page 3448, so that a determinant of one is at least obviously, if not inherently, provided by Shapiro.

Additionally (as another rejection in addition to Shapiro), Zhang et al. further provide evidence for this conventional and well known aspect of having a determinant of one for a wavelet transform in at least c. 5, lines 25-36. It would've been obvious to one having ordinary skill in the art at the time the invention was made to use a wavelet transform that has a determinant equal to one with the wavelet transform of Shapiro, since Zhang et al. provides for wavelets that provide adequate energy concentration in the low frequency wavelets without too much computation in c. 5, lines 25-36.

11. Claims 41 and 43 are rejected under 35 U.S.C. 103 as being unpatentable over the combination of Shapiro, "Embedded Image Coding Using Zerotrees of Wavelet Coefficients", in view of Woods, "Subband Image Coding", (either Pollara et al., "Rate-distortion efficiency of subband coding with integer coefficient filters", or the Applicant's admitted prior art), (either Hartung et al., 5,481,308, or Shinichi, JP406038193A), as applied to claims 39-40, and 42 above, and further in view of Ormsby et al., 5,455,874.

For claim 41, see the rejection of at least claim 1 above.

For claim 43, see the rejection of at least claim 1 above.

Response to Amendment

12. Applicant's arguments filed February 19, 2002 have been fully considered but they are not persuasive.

The Applicant argues on pages 6-14 of the amendment that the rejections are a result of impermissible hindsight, since there are too many references; that Shapiro and Woods do not teach integer arithmetic, since they provide for real coefficients; that Shapiro and Woods do not inherently provide for "neighboring coefficients"; that it is not obvious to combine the arithmetic coder of Ormsby; that the Applicant's admitted prior art reversible S-transform is not overlapping; that Pollara does not provide for a wavelet transform implemented in integer arithmetic that is losslessly recoverable; that the wavelet transform of Shapiro is lossy; that neither Shapiro nor Zhang provide for a determinant of 1; and the none of the prior art provide for a reversible Two/Ten wavelet transform.

The Examiner respectfully disagrees. With respect to impermissible hindsight, as noted in the rejection above, Woods is used to show that Shapiro already teaches overlapped transform filters, so that we are really only considering one reference in this instance. Arguing that too many references defeat a rejection is not persuasive.

Shapiro and Woods may or may not provide for integer arithmetic. The argument that Shapiro and Woods do not provide for integer arithmetic because, Woods recites a "real" coefficient is not persuasive, because Woods can be referring to real versus complex data, rather than integers or non-integers. It is a fact that integers are real numbers, as per the mathematical definition. A more appropriate question is whether Shapiro and/or Woods calculates in floating point or with integers and shifts, for example.

Whether Shapiro or Woods provide for neighboring coefficients is not necessary, since Ormsby does provide for this conventional and well known features. The examiner's argument is simply that since Shapiro does provide for considering more than one symbol in the spatial wavelet decomposition, then it is strongly suggested that the symbols are neighboring, almost by

definition. Furthermore, Shapiro explicitly uses a context, which is even more convincing to have neighboring coefficients, since a context of neighboring coefficients is used in coding.

Shapiro clearly uses an arithmetic coder, and because the arithmetic coder of Ormsby is an improvement in the basic well known coder of Witten et al. (also cited by Shapiro) as noted in the first full paragraph in c. 11 of Ormsby. It is considered quite obvious and desirable to use an improved arithmetic coder with the arithmetic coder of Shapiro.

The Applicant's admitted prior art is not used for the purpose of the conventionality of overlapped filters, as is well known and taught by at least Woods and Shapiro.

Pollara does provide for a wavelet transform in at least the abstract, and further does use integer arithmetic as well in the abstract. The filters of Pollara are perfect reconstruction orthonormal filters, and provide for lossless transforms. The wavelet transform itself is lossless, and therefore losslessly recoverable.

As noted above, as the wavelet transform is lossless, so too is the wavelet transform of Shapiro.

Shapiro does provide for a determinant of one, and Zhang provide for an orthonormal basis, where normality ensures a determinant of one.

A reversible 2-10 transform is well within the level of one of ordinary skill and scope of at least Woods, who provides for a wide variety of filters. Furthermore, both Hartung and Shinichi explicitly provide for this conventional and well known non-critical filter arrangement. Not surprisingly, both Woods and Hartung refer to Johnston with respect to the discussion of quadrature mirror filters (QMF's).

Final

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy M. Johnson whose telephone number is (703) 306-3096.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone numbers are (703) 305-4700 or (703) 305-4750.

The Group Art Unit FAX number is 703-872-9314.

TJ

Timothy M. Johnson
Patent Examiner
Art Unit 2623
March 18, 2002

Timothy M. Johnson
TIMOTHY M. JOHNSON
PRIMARY EXAMINER